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923,013



Inventor: FRANK BASTON

Date of filing Complete Specification: February 1, 1962

Application Date: January 30, 1961.

No. 3464/61

(Patent of Addition to No. 797684 dated April 9, 1956)

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Index at Acceptance:—Classes 122(1), B7E2(A:B); and 122(5), B13B(2B:347B1).

International Classification:—F06j.

COMPLETE SPECIFICATION

ERRATUM

SPECIFICATION NO. 923,013

Page 1, in the heading, for "Inventor: Frank Baston" read "Inventor: Frank Bastow"

THE PATENT OFFICE,
17th May 1963-

DS 74065/1(18)/R. 109 200 5/63 PL

ted Specification a sealing device between
two telescopic cylindrical members relatively
15 displaceable under hydraulic pressure, for
example a ram and cylinder of a hydraulic
pit prop, comprises a sealing ring of U-section
of rubber or similar resilient material
20 located in an annular recess in one of said
members in such a manner that the hydraulic
pressure will tend to expand the flanges of
the sealing ring into fluid tight contact with
the cylindrical wall of the other of said mem-
bers and the opposing wall of said recess,
25 and having means for preventing extrusion
under hydraulic pressure of the yoke portion
of the said sealing ring into a narrow gap
between the two members, the said means
comprising an unsplit supporting ring of a
30 nonmetallic material harder than that of the
sealing ring, said supporting ring having axi-
ally and radially directed flanges fitting into
a complementary rebate in the sealing ring
and having such flexibility as to bridge over
35 the said narrow gap under hydraulic pres-
sure and within the tolerances of shape and
dimensions of the telescopic members.

One object of the present invention is to
provide a form of sealing device in which
40 the resilient elements are of simpler form to
facilitate manufacture.

According to the present invention a seal-
ing device between two telescopic cylindrical

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meric material softer than that of the sup-
porting ring compressively interposed be-
tween the base of the recess and the cylin-
drical surface, the sealing ring being sub-
ject to fluid pressure over the end thereof 60
remote from the supporting ring whereby
the sealing ring bears under fluid pressure
against the inclined side of the supporting
ring to wedge the latter into engagement with
the cylindrical surface.

Two forms of sealing device in accordance
with the present invention are illustrated in
cross-section in Figures 1 and 2 of the draw-
ings accompanying the Provisional Specifi-
cation. Referring to Figure 1 one cylindri- 70
cal member has an annular recess 3 of rec-
tangular cross-section with a transverse end
wall 4. The recess lies opposite the rela-
tively slidable cylindrical surface 5 of the
other member. The working gap between 75
the two members is shown by the clearance
6 and it is desired to prevent extrusion of
the sealing element into this gap under the
access of fluid pressure through the clear-
ance 7 at the opposite end of the recess 3. 80
An unsplit supporting ring 8 of extrusion
resisting elastomeric material such as nylon,
has a generally triangular cross-section. One
side 9 of the section engages the greater part
of the end wall 4 of the recess 3, the other 85
side 10 perpendicular thereto is engageable

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COMPLETE SPECIFICATION

DRAWINGS ATTACHED

Improvements relating to Sealing Devices

We, DOWTY SEALS LIMITED, a British Company of Ashchurch, Tewkesbury in the County of Gloucester, do hereby declare the invention for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to sealing devices and is an improvement in, or modification of, the invention described in prior Specification No. 797,684. According to the printed Specification a sealing device between two telescopic cylindrical members relatively displaceable under hydraulic pressure, for example a ram and cylinder of a hydraulic pit prop, comprises a sealing ring of U-section of rubber or similar resilient material located in an annular recess in one of said members in such a manner that the hydraulic pressure will tend to expand the flanges of the sealing ring into fluid tight contact with the cylindrical wall of the other of said members and the opposing wall of said recess, and having means for preventing extrusion under hydraulic pressure of the yoke portion of the said sealing ring into a narrow gap between the two members, the said means comprising an unsplit supporting ring of a nonmetallic material harder than that of the sealing ring, said supporting ring having axially and radially directed flanges fitting into a complementary rebate in the sealing ring and having such flexibility as to bridge over the said narrow gap under hydraulic pressure and within the tolerances of shape and dimensions of the telescopic members.

One object of the present invention is to provide a form of sealing device in which the resilient elements are of simpler form to facilitate manufacture.

According to the present invention a sealing device between two telescopic cylindrical

members which are relatively displaceable under fluid pressure, comprises an annular recess in one member opposite the relatively slidable cylindrical surface of the other member, a transverse end wall of the recess, an unsplit supporting ring of extrusion resisting elastomeric material having a generally triangular cross-section with two perpendicular sides against the end wall and cylindrical surface respectively and the third side inclined from the cylindrical surface to the end wall, and a sealing ring of an elastomeric material softer than that of the supporting ring compressively interposed between the base of the recess and the cylindrical surface, the sealing ring being subject to fluid pressure over the end thereof remote from the supporting ring whereby the sealing ring bears under fluid pressure against the inclined side of the supporting ring to wedge the latter into engagement with the cylindrical surface.

Two forms of sealing device in accordance with the present invention are illustrated in cross-section in Figures 1 and 2 of the drawings accompanying the Provisional Specification. Referring to Figure 1 one cylindrical member has an annular recess 3 of rectangular cross-section with a transverse end wall 4. The recess lies opposite the relatively slidable cylindrical surface 5 of the other member. The working gap between the two members is shown by the clearance 6 and it is desired to prevent extrusion of the sealing element into this gap under the access of fluid pressure through the clearance 7 at the opposite end of the recess 3. An unsplit supporting ring 8 of extrusion resisting elastomeric material such as nylon, has a generally triangular cross-section. One side 9 of the section engages the greater part of the end wall 4 of the recess 3, the other side 10 perpendicular thereto is engageable

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with the cylindrical surface 5, while the third side 11 forming the hypotenuse is inclined between the cylindrical surface 5 and the end wall 4 to form an acute angle with the base of the recess 3.

The sealing ring 12 is of softer material than the supporting ring 8 and may be of natural or synthetic rubber. The sealing ring comprises a base portion 13 having sides 14 and 15 which meet at an acute angle and respectively engage the base of the recess 3 and the inclined surface 11. A sealing lip 16 extends from the base portion 13 into engagement with the cylindrical surface 5 and a smaller lip engages the base of the recess. When fluid pressure acts through the gap 7 against that end of the sealing ring 12 which is remote from the supporting ring 8, the fluid pressure urges the sealing ring 12 against the inclined surface 11 of the supporting ring 8 whereby the base of the sealing ring 13 is wedged against the base of the recess 3, while the supporting ring 8 is wedged against the cylindrical surface 5. This wedging action increases with fluid pressure owing to the elastic deformation of the material of the supporting ring. The side 10 of the supporting ring firmly engages the cylindrical surface 5 to prevent the softer sealing ring 12 from extruding into the gap 6.

In Figure 2 the sealing ring is an O-ring 17 of natural or synthetic rubber which is radially compressed between the cylindrical surface 5 and the base of the recess 3. Under excess of fluid pressure through the gap 7, the O-ring can deform into increasingly continuous engagement with the base of the recess 3 and the inclined surface 11 of the supporting ring 8. The supporting ring 8 is wedged in similar manner under fluid pressure against the cylindrical surface 5 to prevent extrusion of the O-ring 17 under high fluid pressure into the gap 6.

45 WHAT WE CLAIM IS:—

1. A sealing device between two telescopic cylindrical members which are relatively displaceable under fluid pressure, comprises an annular recess in one member opposite 50 the relatively slidable cylindrical surface of

the other member, a transverse end wall of the recess, an unsplit supporting ring of extrusion resisting elastomeric material having a generally triangular cross-section with two perpendicular sides bearing against the end wall and the cylindrical surface respectively and the third side being inclined from the cylindrical surface to the end wall, and a sealing ring of an elastomeric material softer than that of the supporting ring compressively interposed between the base of the recess and the cylindrical surface, the sealing ring being subject to fluid pressure over the end thereof remote from the supporting ring whereby the sealing ring bears under fluid pressure against the inclined side of the supporting ring to wedge the latter into engagement with the cylindrical surface.

2. A sealing device according to Claim 1, wherein the supporting ring engages the greater part of the end wall whereby the inclined side of the supporting ring and the base of the recess form an acute angle into which the sealing ring is forced by fluid pressure.

3. A sealing device according to Claim 1 or Claim 2 wherein the sealing ring has an acute angled base complementally engaging the inclined side of the supporting ring and the base of the recess, and a sealing lip engaging the cylindrical surface of the member opposite to the recess.

4. A sealing device according to Claim 1 or Claim 2, wherein the sealing ring is of solid circular cross section.

5. A sealing device substantially as herein described with reference to Figure 1 of the drawings accompanying the Provisional Specification.

6. A sealing device substantially as herein described with reference to Figure 2 of the drawings accompanying the Provisional Specification.

For the Applicants

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923,013

PROVISIONAL SPECIFICATION

1 SHEET

This drawing is a reproduction of
the Original on a reduced scale.

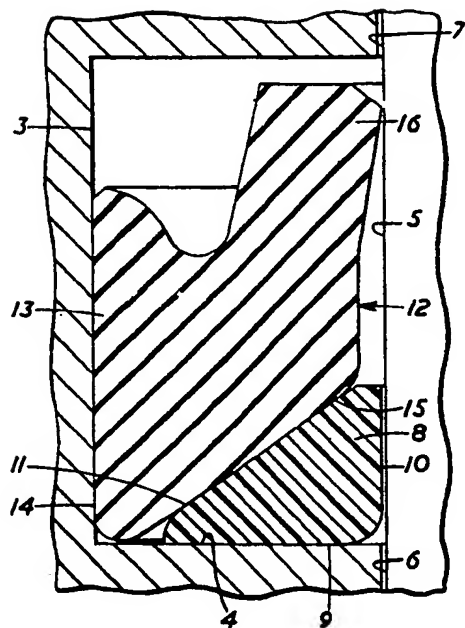


FIG. 1.

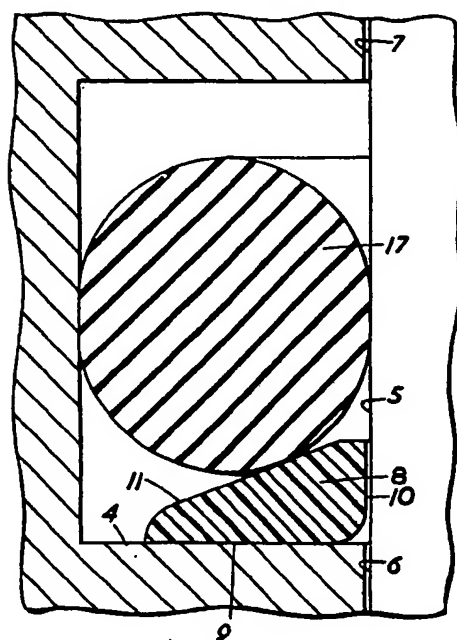


FIG. 2.